

Questions and Answers on Health Effects of Disinfection Byproducts

1. What are disinfection byproducts?

Disinfection byproducts form when disinfectants used to treat drinking water react with naturally occurring materials in the water. The main byproducts that result from use of chlorine as a disinfectant are trihalomethanes and haloacetic acids. Trihalomethanes (TTHMs) and haloacetic acids (HAA5s) form when chlorine reacts with organic and inorganic material in source water (which comes from decomposing plant material, pesticides, etc.). The amount of trihalomethanes and haloacetic acids in drinking water can change from day to day, depending on the season, water temperature, amount of chlorine added, the amount of plant material in the water, and a variety of other factors.

2. Why is drinking water chlorinated?

Chlorinating tap water is critical to protect the public from disease-causing microorganisms. Drinking water is chlorinated to kill bacteria and viruses that cause serious illnesses and, in some cases, death. Chlorination of drinking water has benefited public health enormously by lowering the rates of infectious diseases (for example, typhoid, hepatitis and cholera) spread through untreated water. In the beginning of the last century tens of thousands of people died from disease-causing microorganisms in the water supply.

3. What about disinfectants other than chlorine?

There are a number of other disinfectants that are effective at killing disease-causing microorganisms, but these alternative disinfectants produce different types of disinfection byproducts that also have potential risks.

Water is first disinfected at the treatment plant and is then distributed to homes through a system of pipes. The water in the distribution system must also be continuously exposed to a disinfectant. Therefore, water utilities have to use either chlorine or chloramine (which are made from mixing chlorine with ammonia) as a secondary disinfectant. Chloramine can help reduce some disinfection byproducts, such as trihalomethanes and haloacetic acids, but may not be the perfect solution. Each water system has unique characteristics that must be considered when choosing a disinfectant.

4. What health risks are posed by disinfection byproducts such as TTHMs and HAA5s?

Some people who drink water containing high levels of HAA5s and/or TTHMs over many years may have an increased risk of getting cancer. High levels of TTHMs in drinking water can also cause some people to experience problems with their liver, kidneys, or central nervous systems. However, health officials agree that your related health risk is very low.

At this time there is no evidence that TTHMs and HAA5s in drinking water cause birth defects in humans. There is some evidence from studies in experimental animals that TTHMs may cause birth defects at high doses. It is not known if lower doses would produce similar effects in animals. No association has been observed between HAA5s exposure via drinking water and stillbirth risk. Several other studies indicate that HAA5s do not produce adverse reproductive or developmental effects in humans.

The standards for TTHMs and HAA5s were set by the Environmental Protection Agency (EPA). They are based on worst-case circumstances and use considerable built-in safety factors to protect children and those who consume much more water than two liters per day.

5. I am pregnant. Should I stop drinking my tap water?

First, remember that drinking lots of liquids during pregnancy is very important. Keep following the advice that your health care provider has given you. If you are concerned about the safety of your tap water, you can review the annual water quality report you receive from your utility or ask your water utility about the concentrations of TTHMs and HAA5s and compare them to the current standard (see below for question on current standard).

6. Where can I find more information about disinfection byproducts?

Virginia Department of Health, Division of Public Health Toxicology, (804) 864-8182, or visit the Web site at <http://www.vdh.virginia.gov/epi/publichealthtoxicology/index.asp>

Visit <http://www.vdh.virginia.gov/DrinkingWater/index.htm> for additional information about drinking water regulations, or call Environmental Protection Agency's Safe Drinking Water Hotline 1-800-426-4791.